

What is claimed is:

- 1) A solid diamond electron emitter comprising a diamond greater than  $5\mu$  in thickness having a pointed surface with a radius of less than about  $100\mu$ .
- 2) The solid diamond electron emitter of claim 1 wherein said radius is less than about  $10\mu$ .
- 3) The solid diamond electron emitter of claim 2 wherein said radius ranges from about 3 angstroms to about  $3\mu$ .
- 4) The solid diamond electron emitter of claim 2 wherein said point has a surface roughness of between about 20 angstroms and about  $10\mu$ .
- 5) The solid diamond electron emitter of claim 2 wherein said point has a surface roughness below about 10 angstroms.
- 6) The solid diamond electron emitter of claim 1 wherein said point is produced using a non-contact machining technique.

- 7) The solid diamond electron emitter of claim 4 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.

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- 8) The solid diamond electron emitter of claim 5 wherein said radius is less than about  $10\mu$ .

- 9) The solid diamond electron emitter of claim 5 wherein said radius ranges from about 3 angstroms to about  $3\mu$ .

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- 10) The solid diamond electron emitter of claim 1 further including a conductive shank to which said diamond is adhered.

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- 11) The solid diamond electron emitter of claim 9 wherein said diamond is adhered to said conductive shank by a vapor deposited layer of palladium or titanium.

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- 12) The solid diamond field emitter of claim 10 wherein said radius is less than about  $10\mu$ .

- 13) The solid diamond electron emitter of claim 10 wherein said radius ranges from about 3 angstroms to about  $3\mu$ .

- 5 14) The solid diamond electron field emitter of claim 13 wherein said point is produced using a non-contact machining technique.

- 10 15) The solid diamond electron emitter of claim 14 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.

- 15 16) A field emitter extractor gauge comprising a field emitter array, an anode grid, a focus plate, a reflector and a collector wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than  $5\mu$  in thickness having a pointed surface with a radius of less than about  $100\mu$ .

- 20 17) A residual gas analyzer comprising a field emitter array, an anode grid, a focus plate and a quadrupole wherein said field emitter array comprises an array of solid diamond electron

emitters each comprising a diamond greater than  $5\mu$  in thickness having a pointed surface with a radius of less than about  $100\mu$ .

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add B5

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